ABSTRACT OF THE DISCLOSURE

A processing method that uses process gas plasma that contains at least hydrogen to terminate dangling bonds in an object that at least partially contains a silicon system material includes the steps of placing the object on a susceptor in a process chamber that includes a dielectric window and the susceptor, and controlling a temperature of the susceptor to a predetermined temperature, controlling a pressure in the process chamber to a predetermined pressure, introducing the process gas into the process chamber, and introducing, via the dielectric window, microwaves for a plasma treatment to the object into the process chamber so that plasma of the process gas has plasma density of 10^{11} cm^{-3} or greater, wherein a distance between the dielectric window and the object is maintained between 20 mm and 200 mm.